

GRADE LEVEL CONTENT EXPECTATIONS



v.4.07

Welcome to Michigan's K-7 Grade Level Content Expectations

SCIENCE PROCESSES

PHYSICAL SCIENCE

LIFE SCIENCE

EARTH SCIENCE

Purpose & Overview

In 2004, the Michigan Department of Education embraced the challenge of creating Grade Level Content Expectations in response to the federal No Child Left Behind Act of 2001. This act mandated the existence of a set of comprehensive state grade level assessments in Mathematics and English Language Arts that are designed based on rigorous grade level content. In addition, assessments for science in elementary, middle and high school, were required. To provide greater clarity for what students are expected to know and be able to do by the end of each grade, expectations for each grade level have been developed for science.

In this global economy, it is essential that Michigan students possess personal, social, occupational, civic, and quantitative literacy. Mastery of the knowledge and essential skills defined in Michigan's Grade Level Content Expectations will increase students' ability to be successful academically, and contribute to the future businesses that employ them and the communities in which they choose to live.

Reflecting best practices and current research, the Grade Level Content Expectations provide a set of clear and rigorous expectations for all students, and provide teachers with clearly defined statements of what students should know and be able to do as they progress through school.

Development

In developing these expectations, the Scholar Work Group depended heavily on the *Science Framework for the 2009 National Assessment of Educational Progress* (National Assessment Governing Board, 2006) which had been the gold standard for the high school content expectations. Additionally, the *National Science Education Standards* (National Research Council, 1996), the Michigan Curriculum Framework in Science (2000 version), and the *Atlas for Science Literacy*, Volumes One (AAAS, 2001) and Two (AAAS, 2007), were all continually consulted for developmental guidance. As a further resource for research on learning progressions and curricular designs, *Taking Science to School: Learning and Teaching Science in Grades K-8* (National Research Council, 2007) was extensively utilized. The following statement from this resource was a guiding principle:

"The next generation of science standards and curricula at the national and state levels should be centered on a few core ideas and should expand on them each year, at increasing levels of complexity, across grades K-8. Today's standards are still too broad, resulting in superficial coverage of science that fails to link concepts or develop them over successive grades."

Michigan's K-7 Scholar Work Group executed the intent of this statement in the development of "the core ideas of science...the big picture" in this document.



Office of School Improvement

Curriculum

Using this document as a focal point in the school improvement process, schools and districts can generate conversations among stakeholders concerning current policies and practices to consider ways to improve and enhance student achievement. Together, stakeholders can use these expectations to guide curricular and instructional decisions, identify professional development needs, and assess student achievement.

Assessment

The Science Grade Level Content Expectations document is intended to be a curricular guide with the expectations written to convey expected performances by students. Science will continue to be assessed in grades five and eight for the Michigan Educational Assessment Program (MEAP) and MI-Access.

Understanding the Organizational Structure

The science expectations in this document are organized into disciplines, standards, content statements, and specific content expectations. The content statements in each science standard are broader, more conceptual groupings. The skills and content addressed in these expectations will, in practice, be woven together into a coherent, science curriculum.

To allow for ease in referencing expectations for the draft review, each expectation has been coded with a discipline, standard, grade-level, and expectation number. For example, **P.MO.00.09** indicates:

P - Physical Science Discipline

MO-Motion of Objects Standard

00-Kindergarten Expectation

09-Ninth Expectation in the Kindergarten Grade-Level

Discipline 1 Science Processes	Discipline 2 Physical Science	Discipline 3 Life Science	Discipline 4 Earth Science
Standards			
Inquiry and Reflection (IR)	Motion of Objects (MO) Energy (EN) Properties of Matter (PM) Changes in Matter (CM)	Organization of Living Things (OL) Heredity (HE) Evolution (EV) Ecosystems (EC)	Earth Systems (ES) Solid Earth (SE) Fluid Earth (FE) Earth in Space and Time (ST)

(Note: Final coding will be different than this draft document coding, and will incorporate content statements and content expectations into the coding.)

Preparing Students for Academic Success

Within the hands of teachers, the Grade Level Content Expectations are converted into exciting and engaging learning for Michigan's students. As we use these expectations to develop units of instruction and plan instructional delivery, it is critical to keep in mind that content knowledge alone is not sufficient for academic success. Students must be able to apply knowledge in new situations, to solve problems by generating new ideas, and to make connections between what they learn in class to the world around them. The art of teaching is what makes the content of learning become a reality.

Through the collaborative efforts of Michigan educators and creation of professional learning communities, we can enable our young people to attain the highest standards, and thereby open doors for them to have fulfilling and successful lives.

SCIENCE PROCESSES**Inquiry, Reflection, and Social Implications**

S.IR.00.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation. Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IR.00.01 Make purposeful observation of the natural world using the five senses.

S.IR.00.02 Generate questions based on observations.

S.IR.00.03 Plan and conduct simple investigations.

S.IR.00.04 Manipulate simple tools that aid observation and data collection.

S.IR.00.05 Make accurate measurements with appropriate units for the measurement tool.

S.IR.00.06 Construct simple charts and graphs from data and observations.

S.IR.00.07 Communicate and present findings of observations.

S.IR.00.08 Develop research strategies and skills for information gathering and problem solving.

S.IR.00.2 Reflecting knowledge is the application of scientific knowledge to new and different situations. Reflecting knowledge requires careful analysis of evidence that guides decision making and the application of science throughout history.

S.IR.00.09 Recognize that science investigations generally work the same way in different places.

S.IR.00.10 Recognize that when science investigations are done the same way, very similar results are expected.

S.IR.00.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits and activities.

PHYSICAL SCIENCE**Motion of Objects**

P.MO.00.1 An object's position can be described by locating the object relative to other objects or a background. The description of an object's motion from one observer's view may be different from that reported from a different observer's view.

P.MO.00.12 Compare an object's position to other objects around it.

P.MO.00.13 Explain how a moving object looks different when viewed from different locations.

P.MO.00.3 A force is either a push or a pull. The motion of objects can be changed by forces. The size of the change is related to the size of the force. The change is also related to the weight (mass) of the object on which the force is being exerted. When an object does not move in response to a force, it is because another force is being applied by the environment.

P.MO.00.14 Demonstrate pushes and pulls.

P.MO.00.15 Observe that objects move in the direction of the push or pull.

P.MO.00.16 Observe how pushes and pulls can change the speed or direction of moving objects.

P.MO.00.17 Predict how shape, size and weight of an object can affect motion.

P.MO.00.4 Earth pulls down on all objects with a force called gravity. With very few exceptions, objects fall to the ground no matter where the object is on the Earth.

P.MO.00.18 Observe how objects fall toward the earth.

LIFE SCIENCE

Organization of Living Things

L.OL.00.1 Animals need air, water, and a source of energy (food). Plants also require air, water, and a source of energy (light to make food). Plants and animals break down food to produce building material for growth and repair.

L.OL.00.19 Describe the basic needs of organisms.

L.OL.00.20 Identify and compare living and nonliving things.

EARTH SCIENCE

Solid Earth

E.SE.00.3 Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.

E.SE.00.21 Identify Earth materials (air, water, soil) that are used to grow food.